



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2020/2021		
BACHELOR'S DEGREE (BSC)	SPEECH THERAPY (QUALIFYING FOR THE PROFESSION OF SPEECH THERAPIST)		
INTEGRATED COURSE	PHYSICS AND STATISTICS - INTEGRATED COURSE		
CODE	19651		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	FIS/07, MED/01		
HEAD PROFESSOR(S)	MATRANGA DOMENICA	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	MATRANGA DOMENICA	Professore Ordinario	Univ. di PALERMO
	MUSCIOTTO FEDERICO	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	6		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>MATRANGA DOMENICA Friday 12:00 13:30 Stanza della docente, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina interna e specialistica di eccellenza "G. D'Alessandro", Via del Vespro, 133, piano terra</p> <p>MUSCIOTTO FEDERICO Tuesday 15:00 17:30 Dipartimento di Fisica e Chimica, Viale delle Scienze, Ed. 18, Gli studenti sono pregati di prenotarsi tramite email .Department of Physics and Chemistry, Viale delle Scienze, Ed. 18, Students are requested to book the session through email.Il ricevimento puo tenersi anche online tramite l'applicativo Microsoft Teams. Meeting with students can be held online through Microsoft Teams.</p> <p>Thursday 15:00 17:30 Dipartimento di Fisica e Chimica, Viale delle Scienze, Ed. 18, Gli studenti sono pregati di prenotarsi tramite email .Department of Physics and Chemistry, Viale delle Scienze, Ed. 18, Students are requested to book the session through email.Il ricevimento puo tenersi anche online tramite l'applicativo Microsoft Teams. Meeting with students can be held online through Microsoft Teams.</p>		

PREREQUISITES	The prerequisites are those required at the national level in order to access to Courses for Health Professions.
LEARNING OUTCOMES	<p>Knowledge and understanding To know and to understand the basic principles of physics of biological systems, Knowledge and understanding of descriptive statistics methodologies, probability calculus and measurement of accuracy of diagnostic tests. Acquire a specific language of the disciplines of applied physics and medical statistics.</p> <p>Applying knowledge and understanding The student must have full knowledge of the basic principles of physics and medical statistics, and must be able to know how to choose the instrumental technique more suitable for a physiological parameter measurement. He must know how to evaluate the accuracy of the measurement of a physiological parameter. He must be able to assess the physical and biochemical principles that underlie certain physiological mechanisms and their relevance for diagnostic purposes. Finally, the student must know how to apply basic concepts of physics and biochemistry to practical examples and to problemsolving.</p> <p>Students will also be able to apply the acquired knowledge to read and to do critical appraisal of the most important scientific literature in their professional field, and will have the capacity for analysis, synthesis and argumentation and critical and linking skills, with reference to the topics dealt with. They will understand the basic concepts of medical statistics and use them to solve problems.</p> <p>Making Judgments Being able to evaluate and integrate independently the acquired knowledge in physics and biochemistry in the study of organisms and in particular human ones.</p> <p>Communication skills Ability to correctly describe the physical principles underlying the biomedical and biological phenomena, presenting in a clear and rigorous way the hypothesized model, the mathematical procedure used and the results obtained. Ability to correctly describe the characteristics of a statistical population or sample and to communicate the statistical methodology used for data analysis.</p> <p>Learning skills Capacity to deepen, not in a notional way but rather with a critical and quantitatively founded approach, the concepts presented during the course, even through the study of different texts. Ability to take into account the approximations on which a physical model is based, and therefore of its limitations in effectively describe the biological and biomedical processes. Ability to develop self-learning capacities in the biomedical field, in order to continue studying independently.</p>
ASSESSMENT METHODS	<p>The examination consists of a written test that may be followed by an oral test. The written test will consist of multiple-choice and open response tests. The tests will cover all parts of the program. This test aims to assess whether the student has knowledge and understanding of the topics. It is passed if the candidate scores at least 15/30.</p> <p>During the oral examination, the candidate will have to answer questions posed orally on all parts of the program. This check aims at assessing whether the student has knowledge and understanding of the topics and has acquired interpretative and communicative skills. The oral test is compulsory if the written test score is less than 18/30. The oral examination is at the discretion of the Commission if the written test score exceeds 18/30. It may be requested by the student only if he/she has obtained a score higher than 18/30 in the written test. The final evaluation will be graded based on the following scale:</p> <p>A) Excellent knowledge of teaching content; the student demonstrates high analytic-synthetic capacity and is able to apply the knowledge to solve highly complex problems (score 30, 30L; Excellent)</p> <p>B) Excellent knowledge of teaching content and excellent properties of language; students demonstrate analytical and synthetic skills and able to apply their knowledge to solve problems of medium complexity and, in some cases, even higher (score 27-19; Very Good)</p> <p>C) Good knowledge of teaching content and good properties of language; the student is able to apply knowledge to solve problems of medium complexity (score 24-26; Good)</p> <p>D) Satisfactory knowledge of teaching content, in some cases limited to the main topic; acceptable ability to use the specific language of the discipline and independently apply the knowledge gained (score 21-23; Satisfactory)</p> <p>E) Minimum knowledge of teaching content, often limited to the main topics; modest ability to use the specific language of the discipline and independently apply the knowledge acquired (score 18-20; Sufficient)</p> <p>F) Do not have an acceptable knowledge of the main teaching content; very little or no ability to use the specific language of the discipline and independently</p>

	apply the acquired knowledge (score 1-17; Fail)
TEACHING METHODS	Lectures in the classroom. During the lectures, elementary concepts of physics and medical statistics are taught. Lessons are given through lectures and practicals, also with the aid of information technology and slides that can be downloaded from the UNIPA portal.

MODULE APPLIED MEDICAL PHYSICS

Prof. FEDERICO MUSCIOTTO

SUGGESTED BIBLIOGRAPHY

D. Scannicchio, Fisica biomedica, Edises, Napoli

E. Ragozzino, Elementi di Fisica Per studenti di scienze biomediche, EdiSES, Napoli, 1998.

AMBIT	10326-Scienze interdisciplinari
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

- obtain a good knowledge of several phenomena in the field of physics that are relevant for biomedical and biological applications
- understand and assimilate the epistemological implications of the scientific method, with a particular interest towards models of biomedical and biological phenomena
- learn to critically evaluate the adopted models, identifying their limits and understanding their advantages
- have a good operational understanding of several mathematical tools

SYLLABUS

Hrs	Frontal teaching
2	Introduction to the course. Physical dimensions. Distinction between primitive and composite. Units of measurement. Dimensional equations. Vector vs scalar physical quantities. Vectors
3	Sum and difference of vectors. Scalar and vector product. Significant digits. Error theory. Cinematic quantities: space, speed, acceleration. Uniform rectilinear motion and uniformly accelerated rectilinear motion. Uniform circular motion.
2	First principle of dynamics. Definition of mass. Second principle of dynamics. Forces: elastic forces, gravitational force. Gravitational motion. Motion of a falling body. Motion of a projectile. Friction, static vs dynamical.
3	Work. Theorem of kinetic energy, power. Conservative forces. Theorem of the conservation of energy. Equilibrium and human body. Dimensions of vertebra. Speed of preys.
2	Fluid dynamics, pressure and density. Ideal fluids: Stevino's law, Archimedes' principle, Principle of communicating vessels.
2	Dynamics of Ideal fluids: Leonardo's law, Bernoulli's theorem. Stenosis. Aneurysm.
2	Real fluids: Viscosity, Poiseuille's law, hydrodynamic resistance. Dynamics of real fluids: introduction to laminar and turbulent motion.
2	Stokes' law, Erythrocyte sedimentation rate, centrifuges.
2	Electric charges, electric currents and magnetic phenomena. Coulomb's force and BiotSavart's force. Resistances, Capacitors, Inductance. Ohm's law. RC circuits, RLC circuits.
2	Waves and their characteristics: amplitude, speed, wavelength and period. Wave equation. Transversal and Longitudinal Mechanical Waves. Energy of mechanical waves. Waves overlap. Reflection and refraction.
2	Maxwell's equations. Electromagnetic waves. Electromagnetic spectrum. Energy of Electromagnetic waves. Waves overlap. Refraction and reflection. Diffraction.
2	Doppler's effect. Doppler ultrasonography.
2	Sound and its propagation. Physical properties of sound. Stethoscope.
2	Perception of sound. Unit of measurement of sound pressure (decibel). Spectral decomposition of sound waves. Acoustic impedance. Impedance of human ear.

**MODULE
MEDICAL STATISTICS**

Prof.ssa DOMENICA MATRANGA

SUGGESTED BIBLIOGRAPHY

Libro di testo
Triola MM Triola MF, Statistica per le discipline biosanitarie, Pearson
ISBN: 9788891902580
ISBN: 9788891912091 (Ed. digitale)

AMBIT	10318-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

The course is aimed to introduce the statistical methodology useful to the skills of the health professional. Students will be introduced to the elementary concepts of descriptive statistics, probability calculation and measurement of accuracy of diagnostic tests.

SYLLABUS

Hrs	Frontal teaching
3	Sources of health data
2	Basic concepts: qualitative and quantitative characters, discrete and continuous characters, scales of measurement: nominal, ordinal, intervals and ratio
2	Data presentation: frequency and quantity distributions. Graphical representations
4	Measures of mean and variability with exercises
4	Elements of probability theory. Bayes Theorem. Measures of accuracy of diagnostic tests. Roc Curves
3	Theoretical distributions: Gauss and Binomial distribution, with exercises
2	Central Limit Theorem. Sample distributions of sample mean, with exercises
2	Statistical estimate of the mean and the frequency
2	Statistical tests of significance for the mean and the frequency

Hrs	Practice
2	Practice on the use of health databases
4	Practice on preparation of tables and graphics to describe and summarize data